

FIRE REGIMES ON THE PAYETTE NATIONAL FOREST
BEAR ANALYSIS AREA

FINAL REPORT
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INTRODUCTION

In 1993, fire regimes sampling was conducted in the Bear analysis area on the Payette National Forest, central Idaho. The overall goal of sampling was to provide baseline data for use in developing strategies for ecosystem management. Specific objectives were to determine pre-1900 fire history and model fire regime patterns for the area's major forest cover types. A secondary objective was to interpret the effects of fire suppression after 1900, to identify which ecosystems likely have experienced disrupted fire cycles during this century. It is important to note here that the fire regimes models presented in this report are preliminary in nature, pending possible addition of new data and a future classification for Inland Northwest forests (i.e. ongoing work by the author in conjunction with Intermountain Research Station; projected 1996 completion date).

SAMPLE AREA

An approximately 16,000 acre sample area in the mid to upper Bear- and Indian Creek drainages (Council Ranger District) was selected for sampling after consultation with national forest personnel. Located approximately 30 miles northwest of Council, Idaho, and about 3 miles due east of Hell's Canyon on the Snake River, the analysis area abuts both the Hell's Canyon National Recreation Area and the Seven Devils Scenic Area. Sampling was conducted in this relatively warm-dry zone (4000-8000 ft elev.), where most stands are dominated by various mixes of ponderosa pine, Douglas-fir, western larch, and grand fir (Douglas-fir and grand fir potential climax types). For example, lightly stocked, park-like stands on southerly aspects are dominated by uneven age ponderosa pine and Douglas-fir, and typically key to PSME/SYAL/PIPO or PSME/PHMA/PIPO habitat types (Steele et al. 1981). By comparison, stands are considerably more productive on northerly aspects (e.g., ABGR/ACGL-PHMA h.t.)

and are dominated by multiple fire-initiated age classes of seral ponderosa pine, Douglas-fir, and, occasionally, western larch. Above about 6400 feet elevation, the relatively limited area of subalpine forest is dominated by even-age stands of lodgepole pine and whitebark pine (ABLA series h.t.s), interspersed among the area's extensive grass-forb balds.

METHODS

The methods of Arno and Sneek (1977) and Barrett and Arno (1988) were used to sample fire history. Specifically, a chainsaw was utilized to sample fire scarred trees along transects, and stand tree structures were documented in representative 375 m² sample plots. Scar- and increment core samples were prepared in a laboratory by surfacing the wood, then multiple ring counts were made of the fire scar- and tree pith years. The ring counts were followed by the development of stand- and study area master fire chronologies (MFC), as follows. First, closely similar scar years among clusters of sample trees in a given stand were adjusted to scar samples yielding the clearest scar-ring counts in the stand. After fire year adjustment, the stand fire chronologies were produced by listing all estimated fire years for the site. Stand tree structure then was evaluated by examining the piths of the sample trees relative to the stand fire years, to determine if stands had an even- versus uneven age class distribution. Subsequently, the years in the stand fire chronologies were grouped and adjusted to produce an MFC for the entire analysis area.

Fire frequencies were calculated for the entire analysis area and for the array of sample stands representing major forest cover types. These data were produced by: 1) calculating mean fire interval, 2) listing the range of observed fire intervals, and 3) listing the number of years since last fire. For planning purposes, these data document the natural range of variability in

fire occurrence, both at the landscape level and for each fire regime type. After the fire scar- and stand age class analyses, aerial photographs were used to develop a map of any fire-initiated age classes still visible in unlogged portions of the analysis area. Specifically, the perimeters of even-age polygons arising after relatively severe fires were drawn and labelled on 7.5 minute topographic quadrangles for later entry into a Geographic Information System.

RESULTS AND DISCUSSION

Master Fire Chronology. Longterm timber harvesting has progressively reduced area old growth, but sufficient old trees and undisturbed stands remain to enable estimation of fire history. Fire scarred trees and stumps were found to be abundant in the lower- to mid elevations of the analysis area, and 85 fire scar- and age class samples were obtained from 30 sites. These data produced a relatively continuous four-century record of fire history, back to about 1584. Only 3 fires occurred in the sample area after 1919, evidently small suppressed fires, therefore, the Master Fire Chronology spans from ca. 1584 to 1919. An estimated 47 fires occurred during the pre-fire suppression era (i.e. pre-1919), yielding a mean fire interval of about 7 years for the entire analysis area. Estimated intervals between consecutive fires in the drainage ranged from 1 to as many as 33 years. The latter estimate was obtained from the 2 earliest fires in the chronology (ca. 1584, 1617), and it likely is artificially long because of diminishing data over time. After 1650, for example, intervals between consecutive fires rarely exceeded 10 years. In terms of area fire frequency, therefore, the current fire-free interval of 74 years (i.e. post-1919) represents nearly an eleven-fold increase over the pre-fire suppression era mean.

Most fires in the Master Fire Chronology apparently were localized

underburns in park-like ponderosa pine stands, but a number of fires apparently covered relatively extensive areas of the drainage. For example, fires in 1804, 1834, and 1844, as well as several pre-1800 fires, caused widespread tree scarring and seral regeneration. Some of these fires are relatively closely grouped in time (e.g. 1834, 1844), and might represent evidence of sequential reburns in previously fire killed fuels. Judging from aerial photographs and the locations of the sample trees, as many as 8 of the estimated 47 fires in the chronology (17%) were widespread in the sample area. On average, therefore, as many as 1 of every 5 events during the last 4 centuries grew to large size, producing a mean fire interval of 48 years for such fires. Several fires in the chronology also occurred during well known severe fire years in the Northern Rockies, for example, in 1889, 1910, and 1919. However, because of the elimination of longterm evidence by post-1900 logging, as well as the fact that fuel complexes vary widely on opposing dry- and moist aspects, the fire history age class map is fragmentary (see age class map with this report; and discussed below).

Fire Regime Patterns.

Ponderosa pine/Douglas-fir. In terms of fire occurrence at the stand level, sampling revealed substantially different frequency- and severity patterns on dry- versus relatively moist aspects (table 1). For example, lightly stocked and largely uneven age ponderosa pine stands predominate on dry south slopes (e.g. PSME/SYAL/PIPO and PSME/PHMA/PIPO h.t.s). Scarred pines in these areas often have 10 or more fire scars each, from low intensity underburns. Also attesting to the longterm recurrence of these non-lethal fires, maximum tree ages often exceed 300 years in park-like stands. Twenty-four of the 85 sample trees (28%) pre-dated 1700, and 1474 was the earliest estimated pith year from dry ponderosa pine stands (i.e. approx. 520 yrs old).

In terms of stand fire frequency in this cover type, pre-1919 mean fire intervals from 12 stands ranged from about 14 to 30 years long (12-stand mean: 21 yrs). The estimated intervals between consecutive fires in a given stand usually ranged from 4 to as many as 40 years. These estimates undoubtedly are somewhat conservative, because trees in park-like stands usually do *Not* successfully record every light underburn. As of 1993, however, these stands had not burned for the past 74 to 115 years, and the current fire-free interval averages 98 years. Consequently, this representative statistic for dry ponderosa pine-dominated stands represents a five-fold increase over the presettlement mean.

Because of the inherently high drought-stress on most southerly aspects, the driest sites in this cover type still retain relatively open tree spacing and light stocking--despite the dramatic increase in fire intervals during this century. While this reduces the possibility of ladder fuels and subsequent crown fires, the stands often exhibit substantially increased duff and litter depths that can represent a high fuel risk for individual old trees (Barrett 1988). Future fires can be expected to produce lethal intensities in some tree root crowns, or, will cause partial mortality that predisposes the trees to subsequent mortality from insects and disease. And, on more productive southerly-facing sites at higher elevations, increased tree stocking and thickets of ladder fuels have likewise shifted potential fire severities from the previous pattern of largely non-lethal underburns to one of mixed severity fires in the future. Such fires can be expected to produce lethal severities by means of severe underburning and localized groups of torching trees.

Ponderosa pine/Douglas-fir/Grand fir. Converse to the past fire patterns on dry aspects, relatively moist stands that are dominated by seral ponderosa pine, Douglas-fir, and western larch (i.e. dry grand fir h.t.s) typically contain 2 or 3 old seral age classes that regenerated after mixed

severity underburns (table 1). Scarred trees on these sites usually had from 2 to 4 scars each, but old pines on dry microsites occasionally had as many as 6 or 7 scars. Also attesting to the recurrence of mixed severity fires, moist-site stands often have overstory dominants that are less than 200 years old. Mean fire intervals for 9 stands in this cover type generally range from about 25 to 40 years long. The 9-stand mean was 38 years, about twice as long as in the adjacent dry ponderosa pine-dominated stands. Stand fire frequency also displayed much wider variation than on dry sites, depending on such variables as individual site fire history, stand structure, and elevational position. For example, 2 relatively long stand MFIs of 58 and 84 years were found for this cover type at relatively high elevations in the drainage. Actual fire intervals also ranged widely, from as little as 4 years to as many as 159 years (mean range: 11-68 yrs). As of 1993, however, most stands had not burned for a century or more. In fact, the current fire-free interval averages 107 years for the 9 sample stands, representing a three-fold increase over the presettlement mean.

In fire's absence, dense understories of tall shrubs, and shade-tolerant tree saplings and poles, have developed under the old tree canopies on these productive sites. The plot data suggest that pre-1900 stocking levels may have been as low as 30 or 40 trees per acre on relatively frequently burned sites. However, fire exclusion and past high-grading practices often have produced relatively young, single-layer stands that now have more than 200 pole-size trees per acre. Viewed from a distance, many of these young high-graded stands resemble even-age stands of lodgepole pine, and likely will burn with similar high degrees of intensity during future wildfires. Therefore, on many productive lower elevation sites, the fire regimes pattern has changed from one of primarily mixed severity fires before 1900, to one of potentially lethal fires in the future. As discussed below, this shift toward less frequent- and

higher intensity fires has created a dire future for many ponderosa pine stands in the Interior West (Steele et al. 1986, Mutch et al. 1993).

Lodgepole pine/Subalpine fir/Whitebark Pine. The analysis area contains only a relatively limited amount of subalpine forest, but fire occurrence data were obtained from 4 representative stands. Upper elevation stands that are dominated by lodgepole pine, whitebark pine, and subalpine fir typically contain 1 or 2 seral age classes, but fire scarred trees were relatively uncommon in this portion of the analysis area. Therefore, fire years were estimated from the pith years of even-age lodgepole pines and whitebark pines, as well as from fire-initiated Douglas-firs and western larch in and adjacent to these stands (Barrett and Arno 1988). Fire scarred ponderosa pines on the slopes immediately below these subalpine sites also enabled a determination of some of the fire years that initiated the upper elevation stands.

The 4-stand mean fire interval was 73 years, but site fire frequency was highly variable in the subalpine zone, depending on site type. For example, one park-like stand dominated by old Douglas-firs on a southeast-facing slope (ABLA/SPBE h.t.) contained 5 fire-initiated age classes dating from the late 1600s. These data produced a stand MFI of 49 years for mixed severity fires in the lower portion of the subalpine zone. By comparison, an east-facing stand dominated by lodgepole pine and whitebark pine yielded a MFI of 103 years between lethal- and mixed severity fires. And a northwest-facing stand dominated by lodgepole- and whitebark pine had a single seral age class that had been initiated by a fire in 1804, but also contained a few remnant western larch that had been initiated by a fire in about 1688--yielding an approximately 116 year long fire interval. In fact, intervals ranged widely among these sites, from 16 to 164 years, and the current fire-free interval averages 123 years. While today's fire-free interval is nearly twice the

length of the 4-stand presettlement mean, fire suppression's impacts are less clear for the subalpine zone because there was a large degree of variability in fire frequency even before 1900. Clearly, however, individual stands and area age class mosaics are aging more uniformly than before 1900, thus raising the likelihood of more extensive, and possibly more severe, fires in the future.

Mapping Fires and Fire Regimes. Past logging and the area's widely varying vegetation types made it difficult to accurately determine the areal extents of past fires. For example, the lower elevation, relatively uneven age ponderosa pine stands prevent accurate mapping with aerial photogrammetry because stand canopies lack an even age configuration. Similarly, while stands on northerly aspects often contain even age seral components, past fire perimeters are virtually untraceable on aerial photographs because of highly mixed age class structures. Extensive grassland ecosystems also are interspersed throughout all elevational zones, further masking the perimeters of past fires.

Therefore, one can obtain only a vignette of the past fire mosaic, based on sample tree locations in combination with aerial photographs. Fire-initiated age classes are somewhat more traceable in the subalpine zone, but even here the lodgepole pine stands co-mingle with extensive high elevation balds.

The fire history map (included with this report) is labelled as follows. A "U" label delineates stands that are dominated by uneven age ponderosa pine, indicating that past fires are largely unmappable in these ecosystems. A multiple-age class label of "A" was created for moist-aspect stands that contain multiple fire-initiated age classes. For example, a polygon labelled "A/1750/1825" signifies multiple seral age classes, 2 of which regenerated after fires in 1750 and 1825 (note: age classes are listed in order of predominance). Finally, for subalpine stands that contain just one seral age class (e.g. even-age lodgepole pine), the age class label represents the fire year that regenerated the stand (e.g. "1850").

From a landscape perspective, the age class map reveals a number of important fire history patterns. In terms of fire size (i.e. patch size), relatively extensive fires occurred in 1804, 1844, and 1883, and these fires produced individual stand polygons that today range in size from 50 to several hundred acres in size. However, most polygons below the subalpine zone are mixed age stands, indicating that fires were highly patchy before 1900, as opposed to extensive stand replacing runs. With fire's absence in this century, most stands have aged uniformly, hence, today's polygons are larger than they would have been had fire suppression not occurred. In contrast with a number of severe fires that have occurred in recent years in central Idaho, past fires clearly were significantly more patchy and produced a highly diverse forest mosaic (Steele et al. 1986). Moreover, more extensive stand replacing fires in the future likely would alter landscape patterns to an even greater degree than at present, by inducing mosaic homogeneity across broad areas.

In order to model and map fire regime types, the tree structure- and fire history data were examined for each sample site, followed by a grouping of stands that exhibit similar ecological traits and fire patterns. The fire regime models are delineated by "forest cover type/potential climax" type (e.g. "ponderosa pine/Douglas-fir")(Barrett and Arno 1991). The forest types then were extrapolated and mapped across the entire analysis area (see map included with this report). For example, an estimated 30% of the analysis area is occupied by the ponderosa pine/Douglas-fir fire regime type. This fire regime type occupies all but northerly aspects below about 5000 feet, but becomes increasingly restricted to southerly aspects with increasing elevation, up to about 6000 feet. Note that this fire regime type also contains extensive areas of dry grass-forb communities that contain only a very sparse tree stocking. While largely unforested, these sites still key to ponderosa pine- or Douglas-fir potential climax types (Steele et al. 1981), and burn with roughly similar

degrees of frequency and intensity. As illustrated in Table 1, the ponderosa pine/Douglas-fir fire regime type is characterized by non lethal surface fires that occurred at mean intervals of about 20 years. The area's dry grassland slopes and valley bottoms may have burned substantially more often than that mean interval, particularly in areas that were well travelled by Native Americans. For example, grasslands in some heavy-use areas were purposely ignited annually (Barrett and Arno 1982).

The "ponderosa pine/Douglas-fir/grand fir" fire regime type occupies about 50% of the analysis area. This type typically is restricted to northerly aspects below about 5000 feet, but shifts to predominant status on most aspects between 5500 and 6200 feet elevation. This fire regime type contains the most variability in terms of fire history pattern and post-fire stand structure. For example, the primary stand dominants at lower elevations are multiple-scarred ponderosa pines, but dominance decreases with increasing elevation above 5500 feet. Particularly on sheltered mid- to upper elevation aspects, this species loses its dominant status to serals Douglas-fir and western larch. Steep mid- to upper elevation stands in this type also develop an increasingly even aged configuration, as fire severity increases. Therefore, in general, stands in this fire regime type burned with a mixed severity pattern at mean intervals of 35 or more years, but interval variability was substantially higher than in the adjacent dry ponderosa pine/Douglas-fir fire regime type.

Above about 6200 feet, the "lodgepole pine/subalpine fir/whitebark pine" fire regime type characterizes all but steep southerly slopes, which are often dominated by grass-forb communities. When the latter ecosystems are excluded from consideration, the lodgepole pine/subalpine fir/whitebark pine fire regime type occupies only about 10% of the analysis area. This subalpine vegetative pattern (i.e. forest vs. grassland) apparently is representative of many steep high elevation zones in central Idaho (Steele et al. 1981). In terms of

forested sites, stand structures can vary from relatively densely stocked, even-age stands of lodgepole pine and whitebark pine on sheltered aspects, to open parks that are dominated by multi-aged Douglas-fir on southerly aspects. Consequently, pre-1900 fire patterns also varied widely in the subalpine zone, from a pattern of mixed severity fires on dry aspects to lethal stand replacing runs on sheltered slopes.

To date, lethal- and/or mixed severity fires occurring at mean intervals of about 70 years has been designated for stands in the subalpine zone (table 1). However, given the considerable diversity, future sampling efforts in central Idaho should focus more intensively on determining the natural range of variability in subalpine communities. For example, while there was scant fire scar information at high elevations in this analysis area, fire scarred trees are known to be relatively common in other relatively high elevation zones. Additionally, fire patterns remain relatively undocumented for central Idaho's extensive high elevation grass-forb balds and meadows. These ecosystems require more attention in terms of future sampling--especially since these lands are subject to heavy late-season grazing. Fire suppression and overgrazing likely have severely disrupted historic fire cycles in these non-forested communities, but to date, little fire history information exists to document this possibility.

Implications for Ecosystem Management. The fire regimes sampling points to major challenges for ecosystem management in central Idaho and similar forested areas, such as in Oregon's Blue Mountains (Mutch et al. 1993). To briefly summarize the fire history patterns in the Bear Analysis Area, the Master Fire Chronology between 1584 and 1919 contains few, if any, fire-free decades. However, numerous fires have been suppressed in this area, commonly producing long fire-free intervals in this century. The last important fires occurred between 74 and 91 years ago (1919, 1902 fires), by far the longest intervals on

any given site during the past 400 years. Based on the fire patterns in the pre-1919 Master Fire Chronology, as many as 15 spreading fires might have occurred in the 16,000 acre analysis area in the absence of fire suppression.

At the stand level, most dry-site stands have experienced a five- to tenfold increase in fire interval length, whereas moist-site stands have experienced at least a threefold increase. Mid- to upper elevation stands had substantial variation among observed pre-1900 fire intervals, but the current interval in most subalpine stands is approaching twice the length of the presettlement mean. Additionally, innumerable fire cycles have been precluded in the area's most frequently burned ecosystems, that is, dry grasslands. Fire ecology in the latter ecosystems likely has been further disrupted by overgrazing, which alters both the structure and composition of the fuel complex, as well as fuel loading (Gruell 1980).

At the landscape level, on average, as many as 1 of every 5 fires before 1900 may ^{have} burned substantial portions of the analysis area. However, most fires apparently were limited in extent and highly patchy. Extensive fires were relatively uncommon because the past fuel mosaic was highly diverse, producing a wide range of fire severities and spread patterns during a given fire event. Because of today's increased fuels, all but the driest south slopes can be expected to readily support stand replacing fires during severe fire weather (Steele et al. 1986, Barrett 1988). As evidence of this possible trend in central Idaho, some noteworthy wildfires have occurred during recent years: 1960 Eckels Creek Fire (~30,000 acres), 1987 Eagle Bar Fire (~20,000 acres), and a number of similar events in the Salmon River drainage. Often totalling tens of thousands of acres in major stand replacing runs, such fires burned through areas that had had a previous pattern of non-lethal or mixed severity underburning (Steele et al. 1986, Barrett 1988). Moreover, an additional new threat of severe reburns now exists on sites having large amounts of fire

killed fuels. When reburns occur on unproductive sites underlain by thin, erodible soils, forest succession can be set back for many decades, even with repeated plantings (Barrett 1982). And any artificially induced mass soil movement after large fires conceivably could threaten anadromous fish habitat. This fuel buildup issue seems especially critical for central Idaho, because many of the area's steep dry canyons have long been major travel corridors that have experienced frequent ignitions by humans.

This fire regimes sampling also raises potentially important implications for silvicultural prescriptions at the individual stand level. Numerous other studies (Arno 1980, Steele et al. 1986, Barrett 1988) verify that frequent underburns before 1900 often maintained relatively open stands with comparatively low stocking of uneven-age ponderosa pine. After decades without fire, many understories, particularly those in warm-moist ponderosa pine dominated stands (grand fir-potential climax), have become invaded by dense thickets of shade tolerant conifers and tall shrubs. And many high-graded stands on the less productive sites have developed closed single-layer canopies composed largely of even age, pole-size trees. The relatively recent concept of "restoration silviculture" has direct applicability in such cases, specifically, the restructuring of stands that have been impacted by fire exclusion and poor harvesting practices. Knowledge of past fire patterns can aid the development of management strategies that return stands to a semblance of natural succession (Mutch et al. 1993). For example, the relatively recent shift toward infrequent severe fires well illustrates that high grading and even age silviculture is inappropriate for ponderosa pine-dominated stands. Since these ecosystems evolved with frequent underburns that shaped uneven-age canopies, uneven-age management and maintenance underburning is indicated. Conversely, both even- and uneven age systems would be ecologically appropriate for relatively moist sites, because past fires produced small even age groups

in a diverse mosaic.

Many stands on productive sites today need to be heavily reconfigured. Initially, an aggressive fuel reduction program (e.g., commercial thinnings and prescribed fire) would help reduce the likelihood of widespread stand replacing fires during the future. Prescribed underburning without prior stand thinning often is not recommended (i.e. for non-wilderness lands). For example, spring burns can be relatively ineffective in terms of fuel reduction, or conversely, late season fires can achieve lethal severities in overstocked stands during critical fire weather. However, spring burns might be the most viable alternative for wilderness lands, and can be effective on dry-sites that still retain comparatively park-like stocking. Many of these stands evolved with a regime of early- and late season fires, especially in areas where aboriginal burning occurred (Barrett and Arno 1982). Regardless of site type, after an initial period of fuel reduction and reconstruction, the fire regimes information (table 1) can serve as a natural guide for type of treatment and treatment scheduling.

The fire regimes data also can be useful in developing management strategies for stands at high elevations. Prior to the occurrence of escaped wildfires, area mosaic management would be the most practical approach for mitigating fire spread and severity. Objectives here would be stand fuel reduction and mosaic diversification, particularly near heavily used recreation areas. Past fire cycles may have been disrupted in some high elevation stands. But unlike in the drier forests at lower elevations, the concept of "restoration silviculture" is not usually applicable because most subalpine stands are still within the natural range of succession.

Prior to 1900, subalpine stands occasionally experienced relatively light and patchy underburns or, conversely, comparatively severe fires that killed a majority of the overstory. These severity patterns suggest that even age

silviculture would be an ecologically appropriate approach, for example, by using shelterwood- or seed tree systems to emulate the effects of past stand replacing fires. Ecologically-based prescriptions also could incorporate a mix of even-age and uneven-age silviculture, as well as scheduled prescribed fires during the fall. Aerial photographs can help guide the selection of treatment unit boundaries, first, by examining the fire-generated mosaic, then by targeting the oldest stands for initial treatment where old growth is not a primary value. However, rather than producing very large even-age stand units, maintenance of a mosaic of differentially aged-, sized-, and treated polygons would be the best means of mitigating escaped wildfires, mass soil movement, or insects and disease. Regardless of fire regime type, however, the fire frequency statistics and severity patterns listed in Table 1, and that appear on the age class map, should serve as a useful natural guide for ecosystem management (Mutch et al. 1993).

Table 1. Fire occurrence data for 25 stands in the Bear Analysis Area.

PIPO/PSME COVER TYPE:

Plot No. ¹	Habitat Type ²	Asp.	Fire Chronology	No. Fires ³	MFI	Interval Range	Yrs Since Last Fire
1	Psme/Syal-Pipo	SW	1705-1878	10	19	5-45	115
2	Psme/Phma-Pipo	W	1719-1919	15	14	4-26	74
7	Psme/Phma-Pipo	S	1617-1878	16	17	6-34	115
8	Psme/Phma-Pipo	S	1764-1919	12	14	6-21	74
9	Psme/Phma-Caru	W	1764-1902	7	23	15-61	91
10	Psme/Syal-Syal	SW	1705-1902	9	25	8-45	91
11	Psme/Phma-Caru	W	1688-1889	9	25	8-45	104
14	Pipo/Feid	S	1802-1898	5	24	14-59	95
16	Psme/Phma-Pipo	SW	1678-1898	10	24	10-54	95
18	Psme/Phma-Pipo	SW	1650-1886	9	30	7-58	107
20	Abgr/Spbe	SW	1714-1883	12	15	7-23	110
21	Abgr/Spbe	SW	1678-1883	9	26	5-39	110
MEANS:							21 8-43 98

PIPO/PSME/ABGR COVER TYPE:

Plot No.	Habitat Type	Asp.	Fire Chronology	No. Fires ⁴	MFI	Interval Range	Yrs Since Last Fire
4	Abgr/Acgl-Phma	N	1727-1902	10	19	4-39	91
6	Abgr/Acgl-Phma	W	1743-1878	6	27	14-45	115
12	Abgr/Acgl-Phma	NW	1719-1834	3	58	10-100	159
13	Abgr/Acgl-Phma	NW	1705-1889	7	31	10-65	104
15	Abgr/Caru	NW	1795-1898	4	35	10-54	95
19	Abgr/Acgl-Phma	E	1650-1886	10	26	13-64	107
27	Abgr/Acgl-Phma	E	1584-1898	9	39	23-48	95
29	Abgr/Acgl-Phma	NW	1660-1878	10	24	11-41	115
30	Abgr/Vagl	W	1743-1910	3	84	8-159	83
MEANS:							38 11-68 107

¹ Plot locations on age class map included with report.

² Acronyms follow Steele et al. (1981).

³ Primarily non-lethal fires.

⁴ Includes non-lethal and mixed severity fires.

Table 1 (cont.)

PICO/ABLA/PIAL COVER TYPE:

Plot No.	Habitat Type	Asp.	Fire Chronology	No. Fires ⁵	MFI	Interval Range	Yrs Since Last Fire
22	Abla/Vagl-Vagl	NW	1688-1804	1	-	116	189
23	Abla/Spbe	SE	1688-1883	5	49	16-90	110
24	Abla/Caru	NW	1778-1910	3	66	41-91	83
25	Pial-Abla	W	1678-1883	3	103	41-164	110
				MEANS:	73	54-115	123

⁵ Includes lethal and mixed severity fires.

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